WHAT IS CLAIMED IS:

1. A method of controlling the concentration of positively charged antisite defects in a compound semiconductor comprising:

introducing acceptors into said semiconductor wherein said acceptors have an electronic energy level below the midgap energy level of the uncharged antisite defect.

2. A method as in claim 1 wherein the concentration of said acceptors is balanced with the concentration of the antisite defects.

3. A method as in claim 1 wherein said semiconductor is a III-V compound.

4. A method as in claim 1 wherein said acceptors are selected from the group consisting of C, Be, Zn, Mg, Fe, Cu, and Ni.

5. A method as in claim 1 wherein said acceptor is Be and said semiconductor is LT-GaAs.

6. A method of controlling the fraction of positively charged antisite defects in a compound semiconductor comprising:

introducing acceptors into said semiconductor wherein said acceptors have an electronic energy level below the midgap energy level of the uncharged antisite defect.

7. A method as in claim 1 wherein the concentration of said acceptors is balanced with the concentration of the antisite defects.

8. A method as in claim 1 wherein said semiconductor is a III-V compound.

9. A method as in claim 1 wherein said acceptors are selected from the group consisting of C, Be, Zn, Mg, Fe, Cu, and Ni.

10. A method as in claim 1 wherein said acceptor is Be and said semiconductor is LT-GaAs.

11. A material comprising:

a) a compound semiconductor material having antisite defects therein; and,

b) acceptor atoms in said semiconductor material wherein said acceptor atoms have an electronic energy level below the midgap energy level of the uncharged antisite defect.

12. A material as in claim 11 wherein the concentration of said acceptor atoms is balanced with the concentration of said antisite defects.

13. A material as in claim 11 wherein said semiconductor is a III-V compound.

14. A material as in claim 11 wherein said acceptors are selected from the group consisting of C, Be, Zn, Mg, Fe, Cu, and Ni.

15. A material as in claim 11 wherein said acceptor is Be and said semiconductor is LT-GaAs.

16. A method of producing a thermally stable compound semiconductor by introducing a balanced concentration of acceptors into said semiconductor.

17. A method as in claim 16 wherein the concentration of said acceptors is balanced with the concentration of the antisite defects.

18. A method as in claim 16 wherein said semiconductor is a III-V compound.

19. A method as in claim 16 wherein said acceptors are selected from the group consisting of C, Be, Zn, Mg, Fe, Cu, and Ni.

20. A method as in claim 16 wherein said acceptor is Be and said semiconductor is LT-GaAs.

21. A thermally stable semiconductor material produced according to the process of claim 16.